REMARKS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-9 and 12-23 are presently active in this case, Claims 1-9 and 12-23 having been amended and Claims 10, 11, 24, and 25 having been canceled by way of the present Amendment.

The Applicants wish to thank Primary Examiner Leung for the courtesies extended to Applicants' representative, Christopher Ward, during the personal interview conducted on September 24, 2002.

In the outstanding Official Action, Claims 1 and 12 were rejected under 35 U.S.C. 102(b) as being anticipated by Imai et al. (JP 05-167143A). For the reasons discussed below, the Applicants traverse the anticipatory rejection.

Claim 1 of the present application recites an optical transmission system comprising a light source configured to produce an optical signal. The light source comprises a plurality of densely placed laser diode modules, where each of the plurality of densely placed laser diode modules have an output of at least 100 mW. Claim 12 of the present application recites an optical transmission system comprising a Raman amplifier comprising a light source configured to produce an optical signal. The light source includes a plurality of densely placed laser diode modules, where each of the plurality of densely placed laser diode modules have an output of at least 100 mW.

The Applicants submit that the inventions recited in Claims 1 and 12 of the present application are not disclosed in the Imai et al. reference. More specifically, Claims 1 and 12 recite optical transmission systems including a light source configured to produce an optical

signal. While high-power semiconductor laser equipment is known in the art, the Applicants submit that it was not known at the time of the present invention to include laser diode modules having an output of at least 100 mW in optical transmission systems, for example, in fiber optical communication systems. Claims 1 and 12 expressly recite a light source that is configured to produce an optical signal. The English abstract of the Imai et al. reference does not describe an optical transmission system or the production of an optical signal. Furthermore, the Applicants note that the Imai et al. reference does not describe a Raman amplifier, as recited in Claim 12. Accordingly, the Applicants request the withdrawal of the anticipation rejection of Claims 1 and 12.

Claims 2-11 and 13 were rejected under 35 U.S.C. 103(a) as being unpatentable over Imai et al. Claims 14-25 were rejected under 35 U.S.C. 103(a) as being unpatentable over Imai et al. in view of Halldörsson et al. (U.S. Patent No. 5,265,113). For the reasons discussed below, the Applicants traverse the obviousness rejections.

The basic requirements for establishing a *prima facie* case of obviousness as set forth in MPEP 2143 include (1) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings, (2) there must be a reasonable expectation of success, and (3) the reference (or references when combined) must teach or suggest all of the claim limitations.

The Applicants submit that a *prima facie* case of obviousness has not been established in the present case because (1) the reference(s) does not teach or suggest all of the claim limitations, and (2) there is no suggestion or motivation to modify the reference(s) to arrive at the present invention.

Claims 2 and 14 of the present application recites an optical transmission system comprising a light source configured to produce an optical signal. Claim 13 recites an optical transmission system comprising a Raman amplifier comprising a light source configured to produce an optical signal.

The Applicants submit that the inventions recited in Claims 2, 13, and 14 of the present application are not disclosed in the Imai et al. reference. More specifically, Claims 2, 13, and 14 recite optical transmission systems including a light source configured to produce an optical signal. The English abstract of the Imai et al. reference does not describe an optical transmission system or the production of an optical signal. Furthermore, the Applicants note that the Imai et al. reference does not describe a Raman amplifier, as recited in Claim 13.

While semiconductor laser equipment is generally known in the art, the Applicants submit that it was not known at the time of the present invention to include laser diode modules having a laser diode module and a heat pipe in optical transmission systems, for example, in fiber optical communication systems. In general, the power output for a machine processing laser device is large, however, the power output of a light source in optical transmission systems is much smaller due to size restraints on such devices and the need to control a temperature in the system. In optical transmission systems, it is desirable to control the temperature within the system because if the temperature of the light source is not controlled, then the changes in temperature can effect the optical signal (e.g., the optical wavelength thereof) produced by the system and/or can damage the device by creating increased thermal stresses. The present invention as recited in Claims 2, 13, and 14 advantageously provides a heat pipe within the system, thereby providing a system that can be operated at higher power levels (which will, for example, allow the light source to

communicate further along an optical fiber) without adversely effecting the optical signal and without creating increased thermal stresses. In machine processing laser devices, such problems are not of concern due to the general lack of size restraints, and therefore such laser devices are non-analogous to the present invention as recited in Claims 2, 13, and 14.

The Applicants, therefore, respectfully submit that the rejection is based on the improper application of hindsight considerations. It is well settled that it is impermissible simply to engage in hindsight reconstruction of the claimed invention, using Applicants' structure as a template and selecting elements from the references to fill in the gaps. *In re Gorman*, 933 F.2d 982, 18 USPQ2d 1885 (Fed. Cir. 1991). Simplicity and hindsight are not proper criteria for resolving obviousness. *In re Warner*, 397 F.2d 1011, 154 USPQ 173 (CCPA 1967).

Regarding the interpretation of the phrase "heat transfer fluid" recited in Claim 14, the Applicants note that both gases (e.g., air) and liquids are encompassed within the definition of the term "fluid." The Halldörsson et al. reference is cited for the teaching of cooling water. The Applicants submit that the Halldörsson et al. reference does not supplement the deficiencies in the teachings of the Imai et al. reference discussed above with respect to Claim 14.

Accordingly, the Applicants respectfully request the withdrawal of the obviousness rejections of Claims 2, 13, and 14.

Claims 3, 4, 6-8, 15-18, and 20-22 are considered allowable for the reasons advanced for Claims 2 and 14 from which they depend. These claims are further considered allowable as they recite other features of the invention that are neither disclosed, taught, nor suggested

by the applied references when those features are considered within the context of Claims 2 and 14.

The Applicants traverse the obviousness rejections of Claims 5, 9, 19, and 23, which have been amended to present the subject matter therein in independent form.

The Applicants respectfully submit that Claims 5 and 19 are allowable, since they define a mounting portion having a plurality of laser diode modules mounted thereon, and holes configured to receive heat absorbing portion of a plurality of heat pipes. The Imai et al. reference describes features 4 and 7, which are separate elements. The Imai et al. reference does not disclose a mounting portion (which is singular) that has plural modules mounted thereon and/or plural holes therein. Regarding Claim 19, the Applicants submit that the Halldörsson et al. reference does not supplement this deficiency in the teachings of the Imai et al. reference.

The Applicants respectfully submit that Claims 9 and 23 are allowable, since they recite a mounting portion having a laser diode module mounted thereon and heat radiating fins on a surface thereof. The Applicants note that feature 7 and feature 4 are separate structures, and therefore the Imai et al. reference does not disclose a mounting portion (which is singular) that has both a laser diode module and heat radiating fins mounted thereon. Regarding Claim 23, the Applicants submit that the Halldörsson et al. reference does not supplement this deficiency in the teachings of the Imai et al. reference.

Accordingly, the Applicants respectfully request the withdrawal of the obviousness rejections of Claims 5, 9, 19, and 23.

Consequently, in view of the above discussion, it is respectfully submitted that the present application is in condition for formal allowance and an early and favorable reconsideration of this application is therefore requested.

Respectfully submitted,

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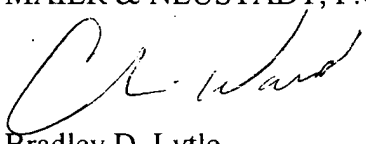

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IN THE CLAIMS

1. (Once Amended) [A] An optical transmission system comprising a light source configured to produce an optical signal, said light source comprising a plurality of densely placed laser diode modules, each of said plurality of densely placed laser diode modules having an output of at least 100 mW.

2. (Once Amended) [A] An optical transmission system comprising a light source configured to produce an optical signal, said light source comprising:

at least one laser diode module including a metal substrate mounting a laser diode chip and an optical component, and a peltier device thermally connected with said metal substrate; and

a heat pipe having a heat absorbing portion and a heat radiating portion, said heat absorbing portion of said heat pipe being thermally connected with said peltier device.

3. (Once Amended) The [light source] optical transmission system according to Claim 2, further comprising a plurality of laser diode modules each including a metal substrate mounting a laser diode chip and an optical component, and a peltier device thermally connected with said metal substrate.

4. (Once Amended) The [light source] optical transmission system according to Claim 3, further comprising a plurality of heat pipes, each of said plurality of heat pipes being thermally connected with a respective one of said plurality of laser diode modules.

5. (Once Amended) [The] A light source [according to Claim 4], [further] comprising:

a plurality of laser diode modules each including a metal substrate mounting a laser diode chip and an optical component, and a peltier device thermally connected with said metal substrate;

a plurality of heat pipes each having a heat absorbing portion and a heat radiating portion, said heat absorbing portion being thermally connected with said peltier device, said plurality of heat pipes being thermally connected with said plurality of laser diode modules; and

a mounting portion having said plurality of laser diode modules mounted thereon, said mounting portion having holes configured to receive heat absorbing portions of said plurality of heat pipes along a lengthwise direction of said respective [on] one of said plurality of laser diode modules, said respective one of said plurality of laser diode modules being thermally connected with a respective [on] one of said plurality of heat pipes received in said holes.

6. (Once Amended) The [light source] optical transmission system according to Claim 4, further comprising heat radiating fins provided on heat radiating portions of said plurality of heat pipes.

7. (Once Amended) The [light source] optical transmission system according to Claim 2, wherein said heat pipe is cylindrical in shape.

8. (Once Amended) The [light source] optical transmission system according to Claim 7, wherein said laser diode module has a bottom portion that includes a curved surface portion, and wherein said heat pipe is tightly connected to said curved surface portion.

9. (Once Amended) [The] A light source [according to Claim 2], [further] comprising:

at least one laser diode module including a metal substrate mounting a laser diode chip and an optical component, and a peltier device thermally connected with said metal substrate;

a heat pipe having a heat absorbing portion and a heat radiating portion, said heat absorbing portion of said heat pipe being thermally connected with said peltier device;

a mounting portion having said laser diode module mounted thereon; and

a plurality of heat radiating fins provided on a bottom surface of said mounting portion.

10. (Cancel)

11. (Cancel)

12. (Once Amended) [A] An optical transmission system comprising a Raman amplifier comprising a light source configured to produce an optical signal, said light source including a plurality of densely placed laser diode modules, each of said plurality of densely placed laser diode modules having an output of at least 100 mW.

13. (Once Amended) [A] An optical transmission system comprising a Raman amplifier comprising a light source configured to produce an optical signal, said light source including:

at least one laser diode module including a metal substrate mounting a laser diode chip and an optical component, and a peltier device thermally connected with said metal substrate; and

a heat pipe having a heat absorbing portion and a heat radiating portion, said heat absorbing portion of said heat pipe being thermally connected with said peltier device.

14. (Once Amended) [A] An optical transmission system comprising a light source configured to produce an optical signal, said light source comprising:

a laser diode module including a laser diode chip, an optical component, and a peltier device, said laser diode chip and said optical component being supported by said peltier device;

a mounting portion having said peltier device mounted thereon such that said peltier device is thermally connected with said mounting portion; and

at least one heat pipe having a first portion extending within said mounting portion and a second portion extending from a side of said mounting portion, said heat pipe having an interior with a heat transfer fluid therein.

15. (Once Amended) The [light source] optical transmission system according to Claim 14, wherein said mounting portion is made of a metal.

16. (Once Amended) The [light source] optical transmission system according to Claim 14, further comprising a plurality of densely placed laser diode modules, each of said plurality of densely placed laser diode modules having an output of at least 100 mW.

17. (Once Amended) The [light source] optical transmission system according to Claim 14, further comprising a plurality of laser diode modules each including a metal substrate mounting a laser diode chip and an optical component, and a peltier device thermally connected with said metal substrate.

18. (Once Amended) The [light source] optical transmission system according to Claim 17, further comprising a plurality of heat pipes, each of said plurality of heat pipes being thermally connected with a respective one of said plurality of laser diode modules.

19. (Once Amended) [The] A light source [according to Claim 18] comprising:

a plurality of laser diode modules each including a laser diode chip, an optical component, and a peltier device, said laser diode chip and said optical component being supported by said peltier device, each laser diode module including a metal substrate

mounting said laser diode chip and said optical component, and said peltier device being thermally connected with said metal substrate;

a mounting portion having said peltier devices mounted thereon such that said peltier devices are thermally connected with said mounting portion; and

a plurality of heat pipes each having a heat absorbing portion extending within said mounting portion and a heat radiating portion extending from a side of said mounting portion, said plurality of heat pipes each having an interior with a heat transfer fluid therein, said plurality of heat pipes being thermally connected with said plurality of laser diode modules,

wherein said mounting portion has holes configured to receive heat absorbing portions of said plurality of heat pipes along a lengthwise direction of said respective on of said plurality of laser diode modules, said respective one of said plurality of laser diode modules being thermally connected with a respective on of said plurality of heat pipes received in said holes.

20. (Once Amended) The [light source] optical transmission system according to Claim 18, further comprising heat radiating fins provided on heat radiating portions of said plurality of heat pipes.

21. (Once Amended) The [light source] optical transmission system according to Claim 14, wherein said heat pipe is cylindrical in shape.

22. (Once Amended) The [light source] optical transmission system according to Claim 21, wherein said laser diode module has a bottom portion that includes a curved surface portion, and wherein said heat pipe is tightly connected to said curved surface portion.

23. (Once Amended) [The] A light source [according to Claim 14, further] comprising:

a laser diode module including a laser diode chip, an optical component, and a peltier device, said laser diode chip and said optical component being supported by said peltier device;

a mounting portion having said peltier device mounted thereon such that said peltier device is thermally connected with said mounting portion;

at least one heat pipe having a first portion extending within said mounting portion and a second portion extending from a side of said mounting portion, said heat pipe having an interior with a heat transfer fluid therein; and

a plurality of heat radiating fins provided on a bottom surface of said mounting portion.

24. (Cancel)

25. (Cancel)